

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-141524

(43)Date of publication of application : 23.05.2000

(51)Int.Cl.

B32B 5/14
B32B 5/02
B32B 21/02
B32B 31/20
// B29C 43/20
C08J 5/04
D04H 1/60
B29K103:00
B29K105:12
B29L 9:00
C08L101:00

(21)Application number : 10-314826

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(22)Date of filing : 05.11.1998

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(54) FIBER LAMINATED BOARD AND ITS MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent the interlaminar peeling by forming an interior structure having the different hardness different from one side face in the thickness direction to the other side face or from the center in the thickness direction to both side faces.

SOLUTION: The hardness of a fiber laminated board formed by heating and pressurizing a fiber laminate composed of a fiber material into which a thermoplastic resin is mixed is different from one side face in the thickness direction toward the other side face or from the center in the thickness direction toward both side faces, and fiber laminates individual one another and their bonding interfaces are not provided thereon. The fiber laminate is preferably a laminate formed of natural fibers and the thermoplastic resin mixed together.

LEGAL STATUS

[Date of request for examination] 05.08.2005

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than

the examiner's decision of rejection or
application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] It is the fiber layered product board characterized by being the fiber layered product board which carries out heating pressurization and comes to fabricate the fiber layered product which comes to be intermingled in textile materials in thermoplastics, and the fiber layered product board concerned differing in hardness gradually from the center of the other side faces from one side face of the thickness direction, or the thickness direction to a both-sides side.

[Claim 2] It is the fiber layered product board characterized by said thermoplastics being thermoplastic fiber in a fiber layered product board according to claim 1.

[Claim 3] It is the fiber layered product board characterized by being the layered product which said fiber layered product made mix thermoplastics with a natural fiber in a fiber layered product board according to claim 1 or 2.

[Claim 4] It is the fiber layered product board which said natural fiber is bast fiber of a kenaf, and is characterized by said thermoplastics being the fiber, the thermoplastic powder, or thermoplastic solvent solution of a biodegradable plastic in a fiber layered product board according to claim 3.

[Claim 5] It is the fiber layered product board characterized by being acetate in which said biodegradable plastic made the benzyl-ized cellulose, the lauroyl-ized cellulose, or the polyethylene glycol intermingled in a fiber layered product board according to claim 4.

[Claim 6] The manufacture approach of the fiber layered product board characterized by being the approach of manufacturing a fiber layered product board according to claim 1, 2, 3, 4, or 5, carrying out the laminating of the fiber web of the thin layer which differs in the mixed ratio of land use of thermoplastics to the order of the size of the mixed ratio of land use of thermoplastics, forming said fiber layered product, carrying out heating pressurization of this fiber layered product, and fabricating a fiber layered product board.

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[Claim 2] It is the fiber layered product board characterized by said thermoplastics being thermoplastic fiber in a fiber layered product board according to claim 1.

[Claim 3] It is the fiber layered product board characterized by being the layered product which said fiber layered product made mix thermoplastics with a natural fiber in a fiber layered product board according to claim 1 or 2.

[Claim 4] It is the fiber layered product board which said natural fiber is bast fiber of a kenaf, and is characterized by said thermoplastics being the fiber, the thermoplastic powder, or thermoplastic solvent solution of a biodegradable plastic in a fiber layered product board according to claim 3.

[Claim 5] It is the fiber layered product board characterized by being acetate in which said biodegradable plastic made the benzyl-ized cellulose, the lauroyl-ized cellulose, or the polyethylene glycol intermingled in a fiber layered product board according to claim 4.

[Claim 6] The manufacture approach of the fiber layered product board characterized by being the approach of manufacturing a fiber layered product board according to claim 1, 2, 3, 4, or 5, carrying out the laminating of the fiber web of the thin layer which differs in the mixed ratio of land use of thermoplastics to the order of the size of the mixed ratio of land use of thermoplastics, forming said fiber layered product, carrying out heating pressurization of this fiber layered product, and fabricating a fiber layered product board.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the manufacture approach of a fiber layered product board and a fiber layered product board.

[0002]

[Description of the Prior Art] The fiber layered product board which carries out heating pressurization and comes to fabricate the fiber layered product which comes to be intermingled in textile materials in thermoplastics is used in the large field as device ingredients, such as a loudspeaker box and acoustic material, as building materials, such as a wallplate, flooring, an impact absorber of an under floor, and a heat insulator, as interior material of an automobile, such as a door trim base material, an inner panel, pillar gar NISHU, a rear package, a head-lining base material, an impact absorber, and acoustic material.

[0003] Moreover, with a fiber layered product board with a hard surface layer and a center section flexible as a thing of the special structure in the fiber layered product board concerned, and this, there is a fiber layered product board with a hard center section and a conversely flexible surface layer. It is used for the fiber layered product board of such structures for effectiveness, such as flexible feeling of absorption of sound, moisture absorption, an impact absorption, and an appearance, aiming.

[0004] This special fiber layered product board of double layer structure consists of two or more fiber layered products which had the hard fiber layered product and the elastic fiber layered product stretched, and is manufactured through three independent processes, the process which fabricates a hard fiber layered product, the process which fabricates an elastic fiber layered product, and the process which stretches both the fabricated fiber layered product.

[0005]

[Problem(s) to be Solved by the Invention] Thus, since the above-mentioned special fiber layered product board of double layer structure is the structure where the hard fiber layered product and the elastic fiber layered product were stretched, in both [these] the lamination interface, it tends to separate and has the problem of being easy to produce interfacial peeling between both fiber layered products. Moreover, while many production processes, such as a process which manufactures two or more fiber layered products which became independent, respectively, and a **** process which makes each of these fiber layered products rival, are required for manufacture of the fiber layered product board concerned and the manufacturing cost becomes high, much production time will be required.

[0006] Therefore, the purpose of this invention is shown in simplifying the production process and aiming at compaction of production time, and reduction of a manufacturing cost while it constitutes the fiber layered product board of short layer structure on which hardness differs from a thickness direction of a fiber layered product and cancels generating of interfacial peeling.

[0007]

[Means for Solving the Problem] This invention relates to the fiber layered product board which carries out heating pressurization and comes to fabricate the fiber layered product which comes to be

intermingled in textile materials in thermoplastics especially about a fiber layered product board and its manufacture approach.

[0008] A deer is carried out and the fiber layered product board concerning this invention is characterized by differing in hardness gradually in the both-sides side from the center of the other side faces from one side face of the thickness direction, or the thickness direction.

[0009] In the fiber layered product board concerning this invention, as for that said fiber layered product is a natural fiber and this natural fiber, it is desirable that it is kenaf fiber obtained from the bast of a kenaf, and, as for that said thermoplastics is the fiber of thermoplastics, powder, and a solvent solution, that this thermoplastics is a thermoplastic biodegradable plastic, and this biodegradable plastic, it is desirable that it is acetate which made the benzyl-ized cellulose, the lauroyl-ized cellulose, or the polyethylene glycol intermingled.

[0010] Moreover, the manufacture approach of the fiber layered product board concerning this invention is an approach of manufacturing each of these fiber layered product boards concerning this invention, and is characterized by carrying out the laminating of the fiber web of the thin layer which differs in the mixed ratio of land use of thermoplastics to the order of the size of the mixed ratio of land use of the fiber which consists of thermoplastics or thermoplastics, forming said fiber layered product, carrying out heating pressurization of this fiber layered product, and fabricating on a fiber layered product board.

[0011]

[Function and Effect of the Invention] The fiber layered product board concerning this invention has the internal structure which differs in hardness gradually in a both-sides side from the center of the other side faces from one side face of the thickness direction, or the thickness direction, and is equipped with the same property as a fiber layered product board with the conventional hard surface layer and a flexible center section, a fiber layered product board with the conventional hard center section and a surface layer conversely flexible [this], etc.

[0012] A deer is carried out, and since it is short layer structure as not a thing but the whole of the double layer structure which made two or more fiber layered products from which hardness differs rival and the interface between layers does not exist, interlaminar peeling does not generate the fiber laminating board concerning this invention. Moreover, in the fiber layered product board concerning this invention, since it can manufacture at a series of processes of having continued from manufacture of a fiber web to the heating pressurization of a fiber layered product, a production process can be simplified and compaction of production time and reduction of a manufacturing cost can be aimed at.

[0013] In the fiber layered product board concerning this invention, if natural fibers, such as a cellulosic fiber, are adopted as textile materials which are the raw material and a biodegradable plastic is adopted as thermoplastics, the fiber layered product board of biodegradability can be constituted and this has the environmental compatibility from the cure against waste treatment etc.

[0014] Moreover, in the fiber layered product board concerning this invention, the kenaf fiber extracted from the bast of a kenaf as textile materials which are the raw material is employable. A kenaf is a therophyte, and since the amount of cellulose exists in that growth in the tropics and a temperate district can grow easily very early, and the bast of a kenaf with 60% or more and high content, it can be utilized very useful as a natural resource.

[0015]

[Embodiment of the Invention] In the fiber layered product board concerning this invention, various kinds of cellulosic fibers which are natural fibers as textile materials, for example, the cellulosic fiber of a woody system or a herb system, are employable. It is desirable from the field of a useful activity of a natural resource, and the field of recycle to adopt the fiber extracted from the kenaf belonging to the herbs which are a therophyte and growth in the tropics and a temperate district can grow easily very early also among these. Since the amount of cellulose exists in the bast of a kenaf with 60% or more and high content especially, use of the kenaf fiber extracted from kenaf bast is desirable.

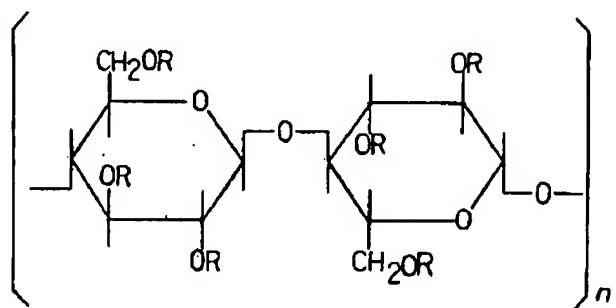
[0016] On the other hand, it is the raw material of a fiber layered product board, it is the synthetic resin of low-melt point points, such as polypropylene, the biodegradable plastic of a low-melt point point, etc. as thermoplastics which functions as a binder of textile materials, and can be used in the state of a

powdered condition, the condition of a solvent solution, or fiber. Also among these, it is desirable to adopt a biodegradable plastic and the fiber layered product board of the biodegradability which suits an environment from the cure against waste treatment etc. by this can be manufactured. The acetate which contains the benzyl-ized cellulose which is a cellulose plastic, a lauroyl-ized cellulose, and a polyethylene glycol as a suitably employable biodegradable plastic can be mentioned.

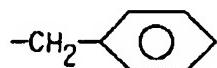
[0017] This applicant for a patent has already done patent application of the benzyl-ized cellulose and lauroyl-ized cellulose which are a cellulose plastic as Japanese Patent Application No. No. 297310 [ten to], and they have the chemical structure type shown in the following (** 1) and (** 2).

[0018]

[Formula 1]

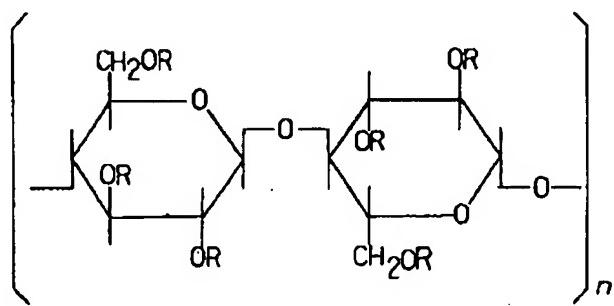


$$R = -H$$

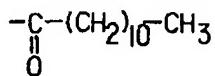


[0019]

[Formula 2]



$$R = -H$$



A benzyl-ized cellulose (** 1) has the melting point of 135 degrees C - 165 degrees C (whenever [permutation / of benzyl] 2.4), and a lauroyl-ized cellulose (** 2) has the melting point of 110 degrees C - 122 degrees C (whenever [permutation / of a lauroyl radical] 2.5-2.8). Moreover, the acetate containing a polyethylene glycol is a thermoplastic constituent which has the melting point of 155 degrees C - 170 degrees C in the constituent which comes to mix the polyethylene glycol of 30wt(s).% in acetate. These cellulose plastics have the biodegradability resulting from the molecule frame of a

cellulose.

[0020] The fiber layered product board concerning this invention thermoplastics to textile materials A fibrous voice and powder condition, It is the thing which carries out heating pressurization and comes to fabricate the fiber layered product which comes to be intermingled in the state of a solvent solution. Or the fiber layered product board of the 1 operation gestalt It has the cross-section structure which differs in hardness gradually on other side faces from one side face of the thickness direction, and has the cross-section structure where, as for the fiber layered product board of other 1 operation gestalten, a center section differs in hardness gradually in a both-sides side from the center of the thickness direction by hard or elasticity and. In addition, in the fiber layered product board of the latter operation gestalt, it can travel in the center section of the thickness direction, and can also be used as a fiber layered product board of the same internal structure as the former.

[0021] The fiber layered product board of the former operation gestalt (1 operation gestalt) among the fiber layered product boards concerning this invention A front face or a rear face is the board with a rear-face side or a front-face side it is hard and flexible which has rigidity lightweight as a whole and moderate. One side of the fiber layered product board of the latter operation gestalt (other operation gestalten) It is the board which has rigidity lightweight as a whole and moderate with a hard center section and flexible front flesh-side both-sides side, and another side of the fiber layered product board of the latter operation gestalt (other operation gestalten) has a flexible center section, and is a board on which front flesh-side both-sides side has hard rigidity lightweight as a whole and high. Therefore, in the fiber layered product board concerned, it can be used according to the property corresponding to the internal structure in a field large as the base material of a proper field, building materials, interior material, and a device ingredient.

[0022] A deer is carried out, and since it is not the double layer structure that made two or more fiber layered products from which hardness differs rival but monolayer structure and the interface between layers does not exist, interlaminar peeling does not generate the fiber layered product board concerned.

[0023] In the fiber layered product board concerned, by adopting natural fibers, such as a cellulosic fiber, as textile materials which are the raw material, and adopting the fiber of a biodegradable plastic, powder, and a solvent solution as thermoplastics, the fiber layered product board of biodegradability can be constituted and this has the environmental compatibility from the cure against waste treatment etc. In this case, as textile materials which are a raw material of a fiber layered product board, if kenaf fiber is adopted, it can utilize very useful as a natural resource.

[0024] Drawing 1 is the production process Fig. showing an example of the manufacture approach of the fiber layered product board concerning this invention. The manufacture approach concerning this invention is equipped with the kenaf fiber **** process as shown in this drawing, until it extracts and **** fiber from the bast of the kenaf which is a fiber raw material, the thermoplastic fiber *** process of ****(ing) the raw cotton of thermoplastic fiber, the laminating process that carries out the laminating of the fiber web of both [these] fiber, and forms a fiber layered product, and the press process which carries out heating pressurization of the fiber layered product, and forms a ***** board.

[0025] At a kenaf fiber **** process, the solution fiber of the bast cut by predetermined die length is hung and carried out to a carding machine, it presupposes that it is curdy, and the raw cotton currently packed up with the thermoplastic fiber *** process is hung and opened to a bale opener, and it hangs and **** to a carding machine, and presupposes that it is curdy, and the KEFUNA fiber cotton and the thermoplastic fiber cotton which were ****(ed) are supplied to each hopper of a laminating process.

[0026] Each hoppers 11 and 12 are arranged in the shape of juxtaposition in the upper part of the conveyance belt 13, and in a laminating process, while the thermoplastic fiber 21 of the set-up constant rate is continued and supplied on the conveyance belt 13 from the 1st hopper 11, from the 2nd hopper 12, it continues on the thermoplastic fiber 21 on the conveyance belt 13, and the kenaf fiber 22 of the set-up constant rate is supplied, and coalesces. The amount of supply of the thermoplastic fiber 21 supplied on the conveyance belt 13 from each hoppers 11 and 12 and kenaf fiber 22 can be changed into arbitration by controlling the rotational frequency of the feed rollers 11a and 12a prepared in the feed hopper side of each hoppers 11 and 12.

[0027] The thermoplastic fiber cotton 21 and the kenaf fiber cotton 22 by which the laminating was carried out on the conveyance belt 13 are formed in the fiber layered product 24 by which it was hung on the carding machine 14, and homogeneity was mixed, it was hung on the vertical trumpet 15 as a continuous thin fiber web 23, the laminating was carried out to the a large number layer, and the laminating of many fiber webs 23 was carried out to the layer. if sequential increase of the supply rate to the kenaf fiber 22 of thermoplastic fiber 21 is intermittently carried out in this laminating process at the time of coalesce of thermoplastic fiber 21 and kenaf fiber 22 -- ** -- on the way -- since -- by performing control which carries out sequential reduction intermittently, it is high in the mixed rate of the kenaf fiber 22 in the center section of the thickness direction of the fiber layered product 24, and front flesh-side both sides make the mixed rate of thermoplastic fiber 21 high.

[0028] In addition, it is easy to make the mixed rate of the kenaf fiber 22 of thermoplastic fiber 21 highly or small from one field side of the thickness direction of that it is high in the mixed rate of the thermoplastic fiber 21 in the center section of the thickness direction of the fiber layered product 24, and front flesh-side both sides make the mixed rate of kenaf fiber 22 high and the fiber layered product 24 by modification of the supply rate at the time of coalesce with thermoplastic fiber 21 and kenaf fiber 22.

[0029] Heating pressure treatment of the formed fiber layered product 24 is carried out at a press process, and it is fabricated by the fiber layered product board. Heating pressure treatment of the fiber layered product 24 prepared by predetermined magnitude is carried out for every sheet with the press machine 16, and the fiber layered product 24 is fabricated at a press process by the fiber layered product board of a predetermined configuration by heating pressurization.

[0030] The obtained fiber layered product board has the cross-section structure where a center section becomes hard gradually to both-sides side by elasticity. In addition, as described above, a center section can manufacture from one flexible cross-section structure and field side gradually to both-sides side by hard easily [the fiber layered product board of the cross-section structure where hardness becomes greatly or small gradually] by changing the mixed rate to the kenaf fiber 21 of the thermoplastic fiber 22 in the thickness direction of the fiber layered product 24.

[0031] A deer is carried out, since it can manufacture at a series of processes of having continued from manufacture of a fiber web to the heating pressure treatment of the fiber layered product 24 according to the manufacture approach concerned, a production process can be simplified and compaction of production time and reduction of a manufacturing cost can be aimed at.

[0032] In addition, in the manufacture approach concerned, although it is desirable on manufacture to adopt the polypropylene fiber which is a low-melt point point as thermoplastic fiber 22, in order to manufacture the fiber layered product board of biodegradability, it is desirable to adopt the above-mentioned thermoplastic fiber which solves and consists of a biodegradable plastic. Moreover, it can change to thermoplastic fiber 22 and the powder of thermoplastics, a solvent solution, etc. can be adopted, and in this case, while skipping a thermoplastic fiber solution fiber process, it can carry out by adding the grant process of thermoplastics.

[Translation done.]